Three New Species from Palas Valley, District Kohistan, North West Frontier Province, Pakistan

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ABSTRACT. *Delphinium palasianum*, *Jasminum leptophyllum*, and *Pseudomertensia flavescens* are described from Palas Valley, District Kohistan, North West Frontier Province (NWFP), Pakistan. Their taxonomic relationships are discussed.

Three new species were discovered during identification of plants collected from Palas Valley. Palas is among those remote areas of the northwestern Himalaya whose botany has been little studied, and no plant inventory of the valley exists. Botanical surveys in the Palas Valley were initiated under the auspices of the BirdLife/WWF, Himalayan Jungle Project. A first survey and plant collections were made in late summer 1992, followed by more collections in 1993 and 1994.

Palas Valley, a large watershed of over 1000 km², lies east of the River Indus in District Kohistan, Hazara Division, NWFP, among the front ranges of the westernmost extension of the Himalayas—the Kohistan Arc. Altitudes range from ca. 1000 m to 5151 m. The topography is rugged and precipitous, with a number of narrow gorges. The main river, the Musha'ga, is about 75 km long and joins the River Indus at 73°05′E, 35°08′N. Palas has warm to hot summers, and cold winters. Climatic figures are not available, but the estimated mean annual precipitation is 900 mm to 1350 mm. Precipitation falls mostly as winter snow. Palas receives summer rains, but is somewhat sheltered from the monsoon by mountains to the south.

Delphinium palasianum Rubina Rafiq, sp. nov. TYPE: Pakistan. Kohistan: Ilobek, ca. 2400 m, Palas valley, 19 Aug. 1993, *Rubina Rafiq 13908* (holotype, RAW; isotypes, RAW, W).

Species maxime affinis *Delphinio denudato* Wallich foliorum florumque forma sed differt inflorescentiis ramosissimis paniculatis multifloris, floribus luteis et folliculis majoribus, 1.5–1.8 cm longis.

Erect perennial. Rootstock woody, slender rhizome-like, covered with fibrous bases of old leaves. Stems erect, terete, ca. 1 m tall, divaricately branched above; branches spreading, subglabrous below, white retrorsely strigulose above. Radical leaves withered at anthesis; petioles up to 20 cm long; lamina 3–5-partite, segments divided to base, coarsely toothed; upper cauline leaves with shorter petioles, lamina divided almost to base into 3–5 linear entire segments. Inflorescences divaricately branched paniculate; bracteoles linear, attached near middle of pedicel. Flowers yellow, 2.5–3 cm long. Pedicels 3–8 cm long, retorsely white pubescent. Sepals yellow, slightly pubescent; spur 1.3–1.5 cm long, longer than sepals, pilose, cylindric, gibberulate below apex. Petals yellow; upper petal obliquely bidentate, pilose; lower petal ovate-elliptic, bearded below middle, deeply cleft. Stamens glabrous; filaments widened below; anthers yellow. Carpels densely strigose hairy. Follicles 3, 1.5–1.8 cm long; style ca. 3 mm long, suberect, divergent at tips, slightly to densely strigose with yellow hairs. Seeds dark brown, scales longer than broad, irregularly arranged.

Habitat. Exposed dry stony slopes at 2400–2700 m. Not very common in the area but occasionally seen growing among small shrubs on avalanche scree slopes in open kind of shrubby vegetation or on the margin of dry temperate coniferous forest with little undergrowth.

Delphinium palasianum resembles *D. denudatum* Wallich ex Hooker f. & Thomson in the shape of leaf and flowers. It can be easily distinguished by its many-flowered, profusely branched paniculate inflorescence, yellow flowers, and larger follicles. This is similar to an undescribed yellow-flowering species mentioned by H. Riedl (1991).

Jasminum leptophyllum Rubina Rafiq, sp. nov. TYPE: Pakistan. Kohistan: above Ban-gah, ca. 1900 m, Palas Valley, 23 Aug. 1993, *Rubina Rafiq 14091* (holotype, RAW).

Species nova e sectione *Alternifolia* foliis alternantibus corolla lutea, maxime affinis *Jasmino florido* Bunge et *J. fruticanti* L. calycis dentibus lineari-subulatis tubo calycis longioribus, sed differt ab his speciebus foliis sessilibus, indivisis, anguste linearibus, corolla majore 3 cm fere longa, floribus paucioribus.

Profusely branched erect shrub ca. 1 m tall. Shoots dark gray, angled or ribbed, glabrous.

Leaves unifoliolate, sessile or subsessile; blade 2.5–2.8 cm long, 1.2–2 mm wide, glabrous, narrowly linear-lanceolate, margins recurved, apex blunt, apiculate. Inflorescences terminal, glabrous, cymose, 1–3-flowered. Pedicels 5–10 mm long. Flowers bright yellow, ca. 3 cm long, heterostylous, fragrant. Calyx glabrous, tube 1.5–2.0 mm long; lobes linear, ca. 3 mm long. Corolla tube ca. 2.2 cm long; lobes elliptic. Stamens 2, attached to corolla tube. Ovary 2-loculed; ovules 2 in each locule. Fruit a bilobed two-seeded berry, light brown when ripe.

Habitat. Open dry steep slopes with rocky and stony soil in the subtropical and warm temperate area of Palas Valley at 1500–2200 m. Known only from the type locality; a small population is confined to a narrow gorge in the *Quercus balloot-Olea ferruginea* zone. *Jasminum leptophyllum* is a subdominant species growing with other associated shrubs, such as *Jasminum humile* L., *Isodon rugosus* (Wallich ex Bentham) Codd, *Abelia triflora* R. Brown, *Pistacia khinjuk* Stocks, *Fraxinus xanthoxyloides* (G. Don) DC., and *Cotoneaster* spp.

Jasminum leptophyllum is related to the members of section *Alternifolia* DC. in having alternate leaves and bright yellow corollas. *Jasminum leptophyllum* is the only species in the section with consistently simple, alternate and very narrow leaves; all other members of the section have at least some leaves compound and broader leaflets. It resembles *J. floridum* Bunge and *J. fruticans* L. in having linear subulate calyx teeth longer than the calyx tube. However, it can easily be differentiated from both species by its simple, narrow, linear, sessile leaves, larger corollas, and fewer flowers. This is the only wild species from Pakistan with bright yellow flowers and simple, alternate leaves.

Pseudomertensia flavescens Rubina Rafiq, sp. nov. TYPE: Pakistan. Kohistan: TikohSar, 3000–3500 m, Palas Valley, 16 June 1994, *Rubina Rafiq 14291* (holotype, RAW; isotypes, RAW, W).

Species affinis *Pseudomertensiae trollii* (Melchior) Stewart & Kazmi, sed calyx dimidium vel ⅔ longitudinis tubi corollae attingens, filamenta 4–5 mm longa, corolla lutea vel alba, folia 3–4 cm longa, 3–5 mm lata. Flores *P. trollii* azurei usque ad obscure purpurei, folia latiora, calyx *P. trollii* var. *trollii* tubum corollae aequans, filamenta 4–5 mm longa, calyx *P. trollii* var. *edelbergii* (Rechinger f. & Riedl) Kazmi tubo corollae brevior, filamenta 2.5 mm longa.

Rhizomatous perennial with few ascending shoots. Branches suberect, 3–8 cm. Basal leaves shorter than upper leaves, with indistinct petioles broader at base and clasping shoots; middle cauline leaves gradually narrowed into elongated petiole, broader at base, with ciliate margin clasping shoots; blade ca. 3–3.5 cm long, 3–5 mm wide, elliptic-lanceolate, entire, covered on both surfaces with thin appressed trichomes. Flowering shoots mostly leafless or sometimes with a single sessile leaf arising from base of vegetative shoots. Inflorescences cymose, terminal, simple, short, curved. Calyx divided to base, ca. 4 mm long; lobes erect, narrowly linear, densely hairy at margins. Corolla yellow or white, tube 6–7 mm long, cylindric-campanulate; lobes ca. 2 mm long, oblong, rounded, spreading; throat scales well developed, broader than long. Stamens exserted from corolla tube; filaments ca. 4 mm long; anthers sagittate. Style exceeding corolla; stigma capitate. Nutlets 4, ovoid-trigonal, glabrous, smooth, shining, dark brown.

Distribution and habitat. *Pseudomertensia* is a small genus represented by 11 species endemic to northwest Himalaya. Two populations of *P. flavescens* were seen in the Palas Valley: one with white flowers growing in shady areas in temperate coniferous forest from 2500 to 2900 m, and the other with yellow flowers growing in open sunny exposed subalpine slopes from 3000 to 3500 m. Other species of *Pseudomertensia* growing in the area are *P. sericophylla* (Riedl) Y. Nasir, *P. trollii* (Melchior) Stewart & Kazmi, and *P. moltkioides* (Royle ex Bentham) Kazmi.

Pseudomertensia flavescens resembles the closely related *P. trollii* (Melchior) Stewart & Kazmi in having exserted stamens and a corolla tube longer than the calyx. It differs in having smaller and narrower leaves and yellow and white flowers. The calyx in *P. trollii* var. *trollii* is subequal to the corolla tube and the filaments are 4–5 mm long, whereas in variety *edelbergii* (Rechinger f. & Riedl) Kazmi it is shorter than the corolla tube and the filaments are ca. 2.5 mm long. In *P. flavescens* the calyx is ½–⅔ of corolla tube and the filaments are 4–5 mm long. *Pseudomertensia parvifolia* (Decaisne) Riedl differs in having the calyx equaling the corolla and corolla lobes acutish and erect as opposed to rounded and spreading in *P. flavescens.*

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